

What is claimed is:

1. An array antenna transceiver for performing broadband transmission by a multicarrier, comprising:

5 means for grouping all subcarriers into a plurality of subcarrier groups and calibrating a transmission route for each group.

2. The array antenna transceiver according to claim 1, wherein said means for calibrating a transmission route includes;

10 a plurality of calibration signal demodulating means for demodulating a transmission route number and subcarrier number for calibration of a transmission route and outputting the demodulation results,

demodulation result processing means for outputting a transmission route number, subcarrier number, and normalized  
15 demodulation symbol point (phase/amplitude information) by receiving demodulation results of calibration signals output from the calibration signal demodulating means and outputting calculated calibration coefficients by receiving demodulation results of calibration signals output from said calibration  
20 signal demodulating means,

demodulation symbol area determining means for determining an area to which each demodulation result belongs on a previously divided I/Q coordinate plane by receiving a transmission route number, subcarrier number, and normalized demodulation symbol  
25 point (phase/amplitude information) output from said

demodulation result processing means and outputting the determination result,

calibration subcarrier selecting means for selecting one transmission route number and subcarrier number closest to the  
5 medium value in a area out of demodulation symbol point (phase/amplitude information) group classified every area output from said demodulation symbol area determining means and outputting the determination results,

calibration control means for outputting a transmission  
10 route number and subcarrier number selected every area output from said calibration subcarrier selecting means and outputting a calibration mode change signal for changing calibration modes, and

transmission baseband processing means for setting  
15 calibration coefficients of all subcarriers in all transmission routes by receiving calibration coefficients output from said demodulation result processing means and a transmission route number and subcarrier number classified into the same area output from calibration coefficients and generating a calibration  
20 signal in accordance with a calibration mode change signal supplied from said calibration control means, a transmission route to be calibrated, and subcarrier information.

3. The array antenna transceiver according to claim 2, wherein  
subcarriers having phase/amplitude characteristics hardly  
25 different each other are grouped in accordance with demodulation results of all subcarriers in all transmission routes

independently of the same transmission route or different transmission routes.

4. The array antenna transceiver according to claim 3, wherein a calibration coefficient is calculated only for one subcarrier  
5 in the same group and the obtained calibration coefficient is set as a calibration coefficient common to all subcarrier groups belonging to the same group.

5. The array antenna transceiver according to claim 3, wherein a subcarrier having a demodulation symbol point closest to the  
10 center in an area in a subcarrier group belonging to the same group is selected as "a subcarrier for calibration".

6. The array antenna transceiver according to claim 3, wherein calibration of all subcarriers in all transmission routes to be grouped is performed in a long cycle and calibration of the  
15 subcarriers in the grouped transmission routes is performed in a short cycle.

7. The array antenna transceiver according to claim 3, wherein a calibration accuracy can be adjusted by changing the number of divided areas to be grouped.

20 8. The array antenna transceiver according to claim 1, wherein said means for calibrating a transmission route includes;  
a plurality of calibration signal demodulating means for demodulating a transmission route number and subcarrier number

for calibration of a transmission route and outputting the demodulation results,

demodulation result processing means for outputting a transmission route number, subcarrier number, and normalized  
5 demodulation symbol point (phase/amplitude information) by receiving demodulation results of calibration signals from the calibration signal demodulating means and outputting calculated calibration coefficients by receiving demodulation results of calibration signals output from said calibration signal  
10 demodulating means,

demodulation symbol group selecting means for outputting a demodulation symbol point, transmission route number, and subcarrier number of the same group by receiving a transmission route number, subcarrier number, and normalized demodulation  
15 symbol point (phase/amplitude information) output from said demodulation result processing means and thereby deciding the same symbol point group in accordance with dispersion of demodulation symbol points of demodulation results,

calibration subcarrier selecting means for selecting one  
20 transmission route number and subcarrier number closest to the medium value in a group out of a demodulation symbol point (phase/amplitude information) group classified every group output from said demodulation symbol group selecting means and outputting the determination results,

25 calibration control means for outputting a transmission route number and subcarrier number selected every group output from the calibration subcarrier selecting means and outputting

a calibration mode change signal for changing calibration modes,  
and

5 transmission baseband processing means for generating a  
calibration signal by receiving a calibration coefficient output  
from said demodulation result processing means and a transmission  
route number and subcarrier number classified into the same group  
output from said demodulation symbol group selecting means and  
thereby setting calibration coefficients of all subcarriers in  
all transmission routes and moreover in accordance with a  
10 calibration mode change signal supplied from said calibration  
control means, a transmission route to be calibrated, and  
subcarrier information.

9. The array antenna transceiver according to claim 8, wherein  
calibration for grouping all subcarriers in all transmission  
15 routes is performed in accordance with temperature information  
of the transceiver.

10. The array antenna transceiver according to claim 2, wherein  
subcarriers in the same group are combined and then a calibration  
coefficient is added to reduce the number of adding circuits.

20 11. An array antenna transceiver according to claim 2, wherein  
neighbor subcarrier groups in which components in a transmission  
route have a similar frequency characteristic (phase/amplitude)  
are grouped in a frequency direction to apply a common calibration  
coefficient.

12. A calibrating method of a transmission route used for an array antenna transceiver for performing wide-band transmission by a multicarrier, comprising:

5 a step of grouping all subcarriers into a plurality of subcarrier groups and calibrating a transmission route for each group.

13. The transmission route calibrating method according to claim 12, wherein said step of calibrating a transmission route includes;

10 a calibration signal demodulating step of demodulating a transmission route number and subcarrier number for calibration of a transmission route and outputting the demodulation result;

demodulation result processing step of outputting a transmission route number, subcarrier number, and normalized demodulation symbol point (phase/amplitude information) by  
15 receiving a demodulation result of a calibration signal output from said calibration signal demodulation step and outputting a calculated calibration coefficient by receiving a demodulation result of a calibration signal output from said calibration signal  
20 demodulating step,

a demodulation symbol area determining step of determining an area to which each demodulation result belongs on a previously divided I/Q coordinate plane and outputting the determination result by receiving a transmission route number, subcarrier  
25 number, and normalized demodulation symbol point (phase/amplitude information) from the demodulation result processing step,

a calibration subcarrier selecting step of selecting one transmission route number and subcarrier number closest to the medium value in an area output from the demodulation symbol area determining step out of demodulation symbol point

5 (phase/amplitude information) groups classified every area output from said demodulation symbol area determining step and outputting the selection results,

a calibration control step of outputting a transmission route number and subcarrier number selected every area output  
10 from said calibration subcarrier selecting step and changing calibration modes, and

a transmission baseband processing step of setting calibration coefficients of all subcarriers in all transmission routes and moreover generating a calibration signal in accordance  
15 with a calibration mode change signal supplied from said calibration control step, a transmission route to be calibrated, and subcarrier information by receiving a calibration coefficient output from the demodulation result processing step and a transmission route number and subcarrier number classified  
20 into the same area output from said demodulation symbol area determining means.

14. The transmission route calibrating method according to claim 13, wherein subcarriers having phase/amplitude characteristics hardly different each other are grouped in  
25 accordance with demodulation results of all subcarriers in all transmission routes independently of the same transmission route or different transmission routes.

15. The transmission route calibrating method according to claim 14, wherein a calibration coefficient is calculated only for one subcarrier in the same group and the obtained calibration coefficient is set as a calibration coefficient common to all  
5 subcarrier groups belonging to the same group.

16. The transmission route calibrating method according to claim 14, wherein a subcarrier having a closest demodulation symbol point closest to the center in an area in a subcarrier group belonging to the same group is selected as "a subcarrier  
10 for calibration".

17. The transmission route calibrating method according to claim 14, wherein calibration of all subcarriers in all transmission routes to be grouped is performed in a long cycle and calibration of the subcarriers in the grouped transmission  
15 routes is performed in a short cycle.

18. The transmission route calibrating method according to claim 14, wherein a calibration accuracy can be adjusted by changing the number of divided areas to be grouped.

19. The transmission route calibrating method according to claim 12, wherein the step of calibrating a transmission route includes;  
20



a calibration signal demodulating step of demodulating a transmission route number and subcarrier number for calibration of a transmission route and outputting the demodulation results,

5 a demodulation result processing step of outputting a transmission route number, subcarrier number, and normalized demodulation symbol point (phase/amplitude information) by receiving a demodulation result of a calibration signal output from said calibration signal demodulation step and moreover outputting a calculated calibration coefficient by receiving  
10 a demodulation result of a calibration signal output from each of the calibration signal demodulating means,

a demodulation symbol group selecting step of deciding the same symbol point group in accordance with the dispersion of demodulation symbol points of demodulation results by receiving  
15 a transmission route number, subcarrier number, and normalized demodulation symbol point (phase/amplitude information) output from said demodulation result processing step and outputting a demodulation symbol point, transmission route number, and subcarrier number of the same group,

20 a calibration subcarrier selecting step of selecting one transmission route number and subcarrier number closest to the medium value in a group out of a demodulation symbol point (phase/amplitude information) groups classified every group output from the demodulation symbol group selecting step and  
25 outputting the determination results,

a calibration control step of outputting a transmission route number and subcarrier number selected every group output from the calibration subcarrier selecting step and moreover

outputting a calibration mode change signal for changing calibration modes, and

5 a transmission baseband processing step of setting calibration coefficients of all subcarriers in all transmission routes by receiving a calibration coefficient output from said demodulation result processing step and a transmission route number and subcarrier number classified into the same group output from said demodulation symbol group selecting step and generating a calibration signal in accordance with a calibration mode change  
10 signal supplied from said calibration control step, a transmission route to be calibrated, and subcarrier information.

20. The transmission route calibrating method according to claim 19, wherein calibration for grouping all subcarriers in all transmission routes is executed in accordance with the  
15 temperature information of the transceiver.

21. The transmission route calibrating method according to claim 13, wherein a calibration coefficient is added after synthesizing subcarriers in the same group to reduce the number of adding circuits.

20 22. The calibrating method of a transmission route used for an array antenna transceiver for performing broadband transmission by a multicarrier according to claim 13, wherein neighbor subcarrier groups in which components in a transmission route have a similar frequency characteristic

(phase/amplitude) are grouped in a frequency direction to apply a common calibration coefficient.